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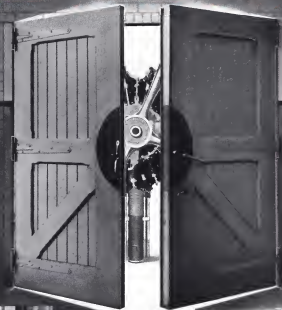
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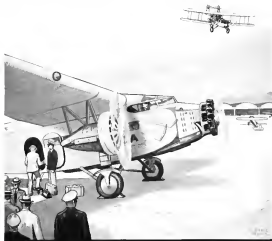
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AVIATION

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The Olden American Aeronautical Magazine

EDWARD P. WATERS, Editor

LEWIS P. SODA, Publishing Director

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2—Wright 700 H.P. Cyclone



3—Curtiss Army A-6B Attack



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5
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engine. This plane is the most
powerful of its kind in the world

9
CURTISS-WRIGHT OPEN. Powered
by a Whirlwind 1400 H.P. engine. This
plane is the most powerful of its kind
in the world

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by a Wright Cyclone 700 H.P. engine.
Many planes of this type were sold to the
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AVIATION

FOR MARCH, 1937

A salutation to the new President

Hon. FRANKLIN D. ROOSEVELT,
Washington, D. C.

Dear Mr. President:

ON JULY 2, 1932, you boarded a transport airplane at Albany and flew to Chicago to address the convention that had just nominated you for the presidency. You enter the White House as the first American president ever to have flown either prior to or during his term of office. We need not extol the ability of aviation to you. You know. You have seen for yourself.

This issue of AVIATION appears just as you are about to become the Chief Executive of the American people. Among the innumerable problems that will surround you to chance for consideration will be the development of a rational and well-balanced aeronautical policy for your administration. Without a definite policy, definitely established and given some measure of continuity, there can be neither efficiency nor economy. An intelligent policy must be guided, and its fact very largely controlled, by the facts of the present situation and by the lessons of experience. It has been our effort, in the pages that immediately follow the conclusion of this letter, to assemble the most important of the material that must be taken into account in deciding upon the future course of the Federal Government in its relations to aviation. The random collection of data, part of it wholly new, part of it already widely known, is very respectfully submitted to you, to your administration, and to the membership of the incoming Congress.

It is a rather striking collection. It constitutes a record of spectacular accomplishment which may well be a source of great pride to all those who have been concerned in making it, and a stimulus to them or to their successors to carry on without loss of ground or loss of momentum. In three years of operation of unprejudiced autonomy, the passenger traffic upon American airlines has tripled.



the mileage flown in air transport has doubled, the use of the air mail has increased by 30 per cent, while the revenue of the Post Office department from all other sources has fallen off by 17 per cent. American airplanes and engines have taken a place of steadily growing importance upon the airways of the world, until today there is scarcely a country in the world where the sky does not echo to the exhaust of American engines and the beat of American propellers, or where the sun does not cast upon the ground the shadow of American wings. The number of licensed pilots is almost twice what it was three years ago, and new pilots continue to qualify at the rate of almost 100 a week.

It is a glowing picture that we present. The main thing that picture will assure to future depend more upon the Federal Government than upon any other thing. Let us be specific. The future depends pre-eminently upon the policy of your administration.

Your trip from Albany to Chicago became possible because of the extension of the air mail service, of the airways prepared by the Department of Commerce, and of the great numbers of airports built and operated, in most cases, by municipalities. The continued availability of a complete, reliable, safe, and efficient national air transportation system for the service of some millions of your fellow citizens depends upon the maintenance of the organization that has been created. Within a few days prior to the composition of this letter there has been serious discussion of the actual abolition of the air-mail service or of a reduction in the scope of that service which would hobble and hamstring it. In looking upon the record as we have presented it herewith, these covers, I am sure that you and your associates will agree that it is almost incredible that anything of the sort should even have been discussed. Nevertheless it is true.

Suggestions that economies might be effected by cutting the amount of service in half, or by turning it back into a few experimental routes, are demonstrably unwise. This country is too large for a small scale transportation system to have any meaning even as an experiment. We must carry on upon a national scale if we are to carry on at all. There is no more economy in trying to run half an air-transport system than in trying to run a six-cylinder automobile engine with only four spark plugs. There is an economy in letting air transport pass into a state of suspended animation for the life blood of air transport is in the organizations that have been created. If we destroy and scatter these organizations, we cannot look forward to picking up the work again where it was left off. We shall have to rebuild almost from the beginning. The only true economy will be found in preserving a continuance of that steady progress toward complete self-support which has marked the record of the last four years. In 1929 the net cost of air mail service to the Post Office department was approximately 80 cents per mile flown. At the present time it is less than half that. Let development go forward, with such changes of course and revisions of policy as accumulating experience may from time to time indicate to you and your Postmaster General to be desirable, and within a very few years the net cost will be down to zero and the service will be returning the government a profit.

In the meantime the air transport system, which must temporarily lean upon the air mail for support, is a national asset and a fruitful source of employment.

American air transport employs over 6,000 people directly and from 3,000 to 6,000 more indirectly. If the whole air mail appropriation were considered as a device for creating employment, the relation between the amount of money spent and the number of jobs called into being would be much more favorable than on money approved public-works projects.

IT IS NOT only air transportation that is involved in the formulation of an aeronautical policy. There is also the question of military aviation. That too is a critical problem.

The American people are pacific by temperament, and far more devoted to civilization than to conflict, but we cannot overlook the meaning of a deeply disturbed world situation. Three undeclared wars are now in actual progress. Others appear to be making. While other countries maintain their appropriations for military aviation, we have cut down on ours. We have cut down both absolutely and relatively, reducing the proportion of our total national defense appropriations going into the operations of the air arm to complete defiance of the teaching of all recent experience and of the warnings of practically all sober students of military affairs that the relative importance of the place of aviation in military activities is constantly growing. The available material for military and naval aviation during the first fifteen months of your own administration, taking the appropriation bills as they now stand, will be less than in any similar period for more than five years past.

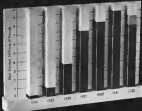
Here again, as in the case of the appropriation for air mail, it is not a treasury problem that confronts us. It is not a case of being able to economize now and make up the lost ground later without loss nation. The maintenance of an efficient aeronautical industry, capable of supplying a military demand when it exists, requires above all things that a nucleus of personnel be held together to carry on technical developments. At the present time, due to the effects of the depression upon potential private purchasers of aircraft, the commercial market is inadequate for the support even of skeleton organizations. The military side must carry the load for the time being if we are to keep aviation going forward. If military appropriations for aeronautical purposes continue to be reduced we shall find in due course that we have eliminated the only sources of supply upon which we can depend in time of need. The aircraft industry can establish its right to be considered as a vital national asset.

AS WE LOOK to the future, we consider ourselves extraordinarily happy in seeing as Chief Executive of the nation a man who was intimately associated with the earliest infancy of naval aviation and with its development to adult estate. We lay the record of American aviation, and American aviation's ease, before you. We feel that the record is good. We believe that the race is a strong race, and we know that it represents a national interest of immense importance. We leave it in your hands.

Very respectfully yours,

The Editors of AVIATION

Air mail postages. The dotted section of the 1932 bar shows the approximate passenger figure that would have been recorded in that year if it had not been for a change of allocation of routes transcontinental mail, which resulted in a change of accounting methods. Taking that into account, the real decrease from 1931 to 1932 was 7 per cent, outside that in the increase in postal rates in July. Up to that time, all transcontinental mail figures were undoubtedly running ahead of both for the previous year, as they have been ever since 1927.



Transport mileage, and passenger mileage. American airlines flew 66,666,000 miles in 1932, and their passenger traffic totaled 143,000,000 passenger-miles. The latter figure, equivalent to moving the entire population of Schenectady or Lake Park on a round trip from their home towns to Chicago and back, is increased 21 per cent over the record of the previous year.

1928

1930

1932



AIRPLANE MILES
Six million in 1928
Eighteen million in 1932



PASSENGER MILES
Six million in 1928
Eighteen million in 1932

airline passengers and express. The American people are really beginning to look at air transport as which they may look ahead except for a possible occasional slight restraint in Europe. In 1932, 524,600 of them flew on American lines. Air express business grows even more rapidly. Its volume has tripled in two years, and last year it reached 1,324,600 lb.

1928

1930

1932



PASSENGER CLASSES
Six million in 1928
Eighteen million in 1932



EXPRESS CLASSES
Six million in 1928
Eighteen million in 1932

Air transport gains favor

Passenger and express traffic make new records

AIR TRANSPORT has won favor as a depression-proof industry.

While practically everything else in the world has been going down, air transport has been going up. While branches of business which have always pooled themselves on their independence have been discovering for government support, the reliance of air transport upon the air mail has been gradually diminishing, and a state of complete economic self-sufficiency with commercial traffic alone has been steadily approached.

A year ago it looked as though the depression had at last struck home in transport flying. Though the miles flown in 1932 were up 20 per cent from the 1930 figure, the passenger-miles had increased only 56 per cent. The average number of passengers carried in each transport airplane during the year had actually decreased.

No depression here

The year just ended, however, turned the curve back to a semblance of its previous disturbed climb. Though the mileage flown in 1933 was very little larger than that of 1932, the passenger traffic as indicated by passenger mileage was increased by almost two quarters. Excluding the mileage flown by airplanes on which no passengers were accommodated, an average of better than four passengers were carried upon every scheduled transport trip during the year. The commercial load factors of the airplanes, or proportion of the available seats occupied by paying guests, ran higher than ever before.

Though the passenger business steadily grows in magnitude and in importance, air mail is still the necessary nucleus of transport flying. A casual examination of the air mail records seems to leave 1932 with one misapprehension upon its history. At first sight, if the figures be taken at their face, they regularly reported, and if there be no examination of what lies below the surface, the air mail seems to have decreased 30 per cent from the previous year. Such a decrease, if it had happened, would be easy enough to

understand. It would simply be in parallel with the general decline of business activities and the general decline of postal receipts. But it did not happen.

On the contrary, if the figures for 1933 be examined on a basis really comparable with those for 1932, the actual work is found to have increased. They show a gain of about 4 per cent in postal use of the air mail service for the month in which any true comparison between 1931 and 1932 can be established. A 56 per cent increase in postage rates at the beginning of July actually produced a sharp drop in the amount of mail sent, and that showed itself in the totals for the year.

Even before July, however, totals of passenger air commerce reported had become misleading. During 1931 the

transcontinental route between New York and Los Angeles was flown over three separate routes, operated under many separate contracts, and it was counted three times in making up the reported totals. Disposing in 1932, such mail has been routed straight through and counted only once. As indicated by a grey-tinted section of the right-hand bar on the chart at the top of the opposite page, that change in accounting method made a difference of approximately 1,200,000 lb. in the apparent amount of mail. The 20 per cent loss which the air mail is frequently said to have undergone in 1932 is therefore purely a fictitious one. It is a bookkeeping error.

Not even the most superficial examination, on the other hand, can fail to show the progress that has been



What a wonder one can do in twelve hours. The lower group of airplanes are located at the points that can be reached in twelve hours from New York on the present regular airline schedule. The heavier group contains those points accessible by the fastest existing means of surface transport. The same group of points, connected in New York by direct lines, are located at the points which will become accessible within twelve hours' travel with the new and faster flying equipment in course of present development in the present time.

Airline map by the Air Transport Society of America, Inc.



ADJUSTED BY AIRCRAFT DENSITY AT VARIOUS STAGES
THE DISTRIBUTION OF AMERICAN AIR TRANSPORT AMONG THE FOUR MAJOR SYSTEMS, EACH OF WHICH BOLTERS AT LEAST TEN STATES



FREQUENCY OF PASSENGER SERVICE ON THE AIR TRANSPORT LINES SIX MONTHS THAT EARLY 1930S COULD BE GUARANTEED



AIRLINE PASSENGER TRAFFIC DENSITY. THE DEPTH OF THE LINE ALONG EACH ROUTE INDICATES THE AVERAGE NUMBER OF PASSENGERS CARRIED EACH DAY DURING 1930.



WHERE THE MAIL FLIES AND HOW OFTEN. THE AMERICAN AIR MAIL SYSTEM, THE INDISPENSIBLE BACKBONE OF OUR PEOPLE'S AIR TRANSPORT DEVELOPMENT

What the factories are doing

Production records show growing dependence on military markets

THIS last three years have been a period of transition in the airplane industry. The chart in the middle of the opposite page makes the transition graphs. In 1929 it seemed for the first time that aviation's long-awaited day of public endorsement was really at hand. The sale of commercial airplanes and engines in 1929 had been four times as large as in 1927. In 1929 it doubled again. The idea of the private airplane had finally made itself felt, and it was being accepted with accelerating rapidity.

In aviation, as in other fields of new engine endeavor, 1929 and 1930 showed some abrupt and unexpected developments. There was some abnormal expansion, there was some over-production, even on the basis of the rapidly growing markets of the time; there was a perfectly preposterous multiplication of the number of independent manufacturing companies. Nevertheless all this would very probably have righted itself, the bright anticipations of the moment might very well have been extremely realized, and commercial aircraft manufacture might have continued on a footing which would have made military airplane production a minor secondary but it has not been for the general economic collapse.

The purchase and use of private airplanes was still something very new, as at the end of 1928. It had not yet had time to embed itself into the business consciousness so that it could be taken for granted. It was fitted, in most cases, among the "extras" of life, a luxury which could be cut off at any time, in bad years for the time being. As the external result of the fact that aviation was still a novelty, and of the economic position that sometimes occupy at the time of a financial crisis, the non-military sales of airplanes have dropped to barely one-fourth of the 1929 figure. In 1932 the commercial production of airplanes totaled but \$2,537,095; that of engines but \$2,086,071.

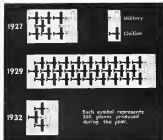
It seems quite certain that we have passed the low point, and 1932 will see the first steps in the rebuilding of a really substantial commercial market.

Transport lines, of course have been making some purchases all through the period of the depression, but they are their dependent so extremely that even the present large amount of transport traffic can be handled with only about 300 planes, approximately 120 of which would normally be replaced each year. The transport demand alone cannot maintain an airplane industry strong enough to be a proper nucleus for possible national needs.

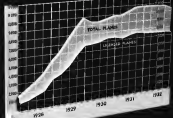
Fortunately, therefore, by the simple power of present facts and pending the rebuilding of the private market for airplanes to something like six times its present magnitude, the preservation of the American industry, and of the engineering ingenuity within the industry upon which national progress so

largely depends, must rest upon military production. As the charts on the opposite page show, the military demand was reasonably well sustained from 1927 to 1931, the years of greatest pressure under the "five-year programs" of the Army and Navy. Last year came the first signal of a rapid decline in military purchasing, and present appropriations make it probable that 1932 will fall to a severity hitherto unseen. The core of the problem is there. The continued development of the concentrated arms in the United States, and the maintenance of an industry capable of adjusting itself to military needs in the event of war, now depend preeminently upon the Federal Government's future provision for military and naval aircraft.

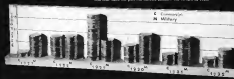
AIRCRAFT PRODUCTION. In 1929 the demand called for the creation of an industry building 4,516 machines a year and still growing. In 1932 private production was temporarily cut off the market. The industry must depend almost entirely upon the military connection, with military planes up to 1000 per year. The military demand was reasonably well sustained from 1927 to 1931, the years of greatest pressure under the "five-year programs" of the Army and Navy. Last year came the first signal of a rapid decline in military purchasing, and present appropriations make it probable that 1932 will fall to a severity hitherto unseen. The core of the problem is there. The continued development of the concentrated arms in the United States, and the maintenance of an industry capable of adjusting itself to military needs in the event of war, now depend preeminently upon the Federal Government's future provision for military and naval aircraft.



Simplest of dependence such value otherwise, the evidence of response to service in the United States is here built on steel. Old machines are still replaced in that the use of them. At the end of 1930, 1,530 planes of commercial types were known for service, and another 1,994 were "classified" for governmental operations.



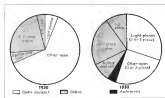
The value of American production of commercial and military airplanes (not including engines). The commercial business, the line of more other manufacturing industries, has felt the blow of the depression. The survival of the industry and its ability to preserve those the conditions which are as service personnel favor in the national defense depend upon and more than upon the maintenance of an adequate level of expenditures for military purposes. The present indication is that the production for military purposes in 1932 will go well below \$10,000,000 for the first time since the previous record failure was reached in 1920.



The value of American engine production, commercial and military. Here, too, commercial production has temporarily fallen off to such an extent that considerable development of the use of engine design brings some continuance of military purchases. Even in 1932, the military production of \$2,537,095 was 21 per cent below that of one previous year since 1924. But recent budget policy seems to threaten still further reduction of a gradually shrinking source.

Commercial Paper

As the makers of commercial airplanes have introduced airframes 8,000 sq ft, 1970 to 540 sq ft (excluding engine nacelles) in 1962, the aircraft industry has changed. A substantial change in type has also occurred. The most conspicuous innovation, as shown in the chart at the right, has been toward the development of open-cockpit planes by the late twenties but more comfortable cabin types. From 1928 through 1933 less than one-third of the planes built had enclosed cabins. In 1932 the cabin plane began what seems likely to be a continuing improvement in its relative position. The chart for 1932 also shows another comparatively new feature in the composition of a 4 per cent weight to the category which was quite unknown to the commercial market until two years ago.

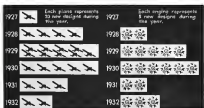


INTERESTING FACTS ABOUT AMERICAN PRODUCTION IN 1939 AND 1940 (These figures which were an only 10 per cent of the total in 1939 increased to over 40 per cent in 1940. Eighty plants, rising at very low cost, made great progress towards a monopoly of the new glass streamer. The machines for which the owner has been able to spend more than \$10,000, the closed type, in which a better use is made of the ordinary machine space, is dominating the field, just as closed bodies have come to dominate automobile production.)

Although open planes made up from 65 to 72 per cent of the total production for a number of years, and still constitute well over a half of the total, there have been great changes in these characteristics. In 1958 no open airplane was either a medium-sized general utility aircraft equipped with a war-time surplus engine that could then be bought for a song, and possibly used for instructing student pilots or for giving passengers what the French so happily describe as a "haquet de la air" or it was a much more expensive, high-

craft of very high performance, and is intended for sale to wealthy private pilots of sporting aerobics. As the chart at the top of the page indicates, TWE brought the first venture in the manufacture of light planes, reducing unit cost of 50 hp or less. They were built to give the opportunity of flying at the absolute minimum of expense, and to open no aviation to a group in which

it would have had to remain a closed book under any other conditions. In the next year there was a great rush of light planes of many makes onto the market and some over-production which unsettled the situation during 1932 and was partly responsible for the abnormally depressed output of non-military airplanes during the year just ended in 1933, in fact, almost exactly a half-



REVENUE AND TAX INFORMATION: In 1979, when new 1980 models were being produced in many regions a total of 105 new types of vehicles and 31 new engines were approved by the Department of Transport for production. Such figures were already large. And yet, according to revenue data in the United States, new models are being put out more and more frequently, but even in 1978 there were in use commercial vehicles, trucks and trailers of 100 different types. In the United Kingdom, the number of different types of vehicles and trailers of new models was 100. By way of comparison, it is interesting to note that 100 American automobile factories combined use only about 15 types of chassis for 100 models of cars. These varied from the four-door without roof rails to the two-door with roof rails, and are now seriously threatened by the introduction through a succession of experimental stages before the public manufacturer is made up his mind to produce a new type. It is not likely to be reduced into a single design for production and sale.

quantities to those to whom flying is a pure sport, and who prefer to get as close to the elements as possible.

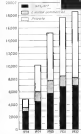
Developing new systems

As suggested in the caption at the bottom of the opposite page, the decrease in the number of new designs submitted for the approval of the Department of Commerce is a noticeable symptom. In 1957 there were 39 new approved type certificates issued for aircraft and 16 for engines, and that is quite enough to keep abreast of the times. In 1958, both because of the way in which experimental machines are gradually open to the market and because of the tremendous number of failures that were being started, the number of new airplane designs approved reached the really absurd total of 388. They represented 73 entirely independent factories. In 1959 the number of independent manufacturing units appearing on the list had fallen to seventeen, a further natural change in the industry as a whole.

Pilosa, students

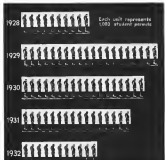
Disregard the checks that the prohibition of affluents had undergone, but note that the number of affluents in the state is little if any smaller in the interest of individuals in learning in the state.

It was of course natural that these should be a good number of students placed in 1925 and 1926, and a very rapid increase in the number of students in the state in these years. Many also who had not been in the state before 1925, and who had previously been in the state, but had not taken out their fluents under the age of gradually increasing the number of students in the composition of the state.



The number of airplanes plus holding fees rose from the importance of the money across every year. At the end of April the total had reached 18,000 and 7,000 of them had received license permits that they had then more than 100 hours of flying and were considered qualified to act as

during 1952. It must be remembered that these incomes are not permanent, but have to be renewed every year, so that the total at any time represents persons who are still drawing a really active income.



NEW AIRCRAFT PILOT PERMITS IN YEARS: Though there has been an overall decline in the number of student permits in the past decade, when the first jet mechanisms of youth travel to Canada and thousands of young men started to get into aviation at a very early age, apparently to get into aviation, the number has been very gradual. Even in 1977, 14,000 student permits were issued, or at the rate of one for every 115 young men reaching the age of 17.

will just reinforce their counter-claim with the aid of applying to Congress or to the courts. Most of those at the annual and temporary assemblies have been elected by the members of ISRA and it is a very encouraging sign of the real depth of American interest in aviation and especially the interest of the younger generation that the number of pilots will increase by 2,439 during 1961, and by 35,000 in the next year, but, however permanent, but how many years, so that the time presents portrayed will be a really active interest.

The industry is opposed to the "limited professional" group of pilots because it lowers the growing ranks of the transport pilots because of their own lack of interest in the private pilot of the line. It is a threat to the private pilot of the line. The industry of all for professional pilots are not so high that there is particularly no chance of employment at the field by anyone who does not have at least a transport pilot's license required for a transport pilot—out of course for employment on the transport line there is some something like two times the amount of experience is the minimum. As the other extreme are a great many pilots who are not interested in flying to make money and of flying, but who are deeply interested in it as a sport or as a means of personal travel. They also private license (the number of which increased by 32 per cent during 1952) and a great many of them are not interested in flying for a living. The grade no matter how much being flying they have accumulated.

As the end of 1932, there were 3,038 students permitted to train. Practically all of their holders are general pilots of the future.

Who owns airplanes?

The 7,330 airplanes that are currently licensed by the Department of Commerce are being used for seven if not hundreds of different employments. Somewhere around a thousand to fifteen hundred of the total number are employed purely for pleasure. All the rest have some business purpose. Another fifteen hundred or so are privately owned and need only for the business travels of the owner and his associates. Seventy are in the hands of various departments of the federal, state and the municipal governments and 222 are owned by surplus manufacturers, some of them being used for company business and for experimental flying purposes, and some simply being held while awaiting sale.

Most extended of all commercial employments of aircraft is the launching of miscellaneous flying advertisements. Flying, special chartered trips with newspapers as express, aerial photography, crop dusting and the like, as well as active sightseeing or "joy-ride" business. There are already a thousand independent services of that sort, they use about 3,000 airplanes, and they have a very important place in the lists of their annual expenditures. Another 150 planes, most of them of the small open-cockpit type, are employed extensively in giving flying instructions.

Perhaps the most interesting group of all, however it is most varied in its employment, is the collection of airplanes that are owned and used for individual purposes by companies not directly engaged in aviation work.



Multi-airplane firms have taken over through the last five years, the number of automobiles in service in the United States has fallen off. The ratio of airplanes to automobiles has steadily increased.

There are 165 of them. Two-thirds of them are cabin planes, and 210 are open-cockpit or more precisely, open-cockpit type, are employed extensively in giving flying instructions.

Airplanes in business

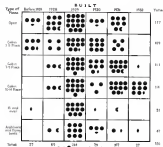
Next in order come makers of machinery of various types, and especially of oil-producing machinery with eleven airplanes. Newspapers hold six planes in their own names, in addition to being very frequent lessees of the machines operated by local flying services when the need suddenly arises to cover a story at a distance. Banks and investment companies have five, makers of automobile accessories six; moving picture companies three (they also are among the most constant patrons of airplane hire services); public utilities

AMERICAN MANUFACTURING PLANTS Constructing type and size of main business. Though these planes built in 1932 and 1933 are active extended service, the process of replacement is going forward rapidly. Most of the passenger machines are in regular use and few have been put aside, and many are equipped to be used in the winter and in the summer months in a way other than pointed above.

Largest users of airplanes among the industrial group are the oil companies, with 74 machines of all types, open and closed, large and small, long-range and amphibious. About two-thirds of the oil company planes belong to national companies engaged both in producing and distributing, while the others are kept in daily service by various independent oilfields for the transportation of themselves and their materials.

Most miscellaneous groups with one or more airplanes owned and in regular service cover practically the whole current of industry, and include rubber companies, insurance companies, shoe makers, manufacturers of auto batteries, manufacturers of silk dyes, makers of steel and gravel, truck bodies, firms, general contractors, makers of electrical machinery, railroads and companies, and real estate brokers. Given a sympathetic hearing and a real opportunity, the airplane seems to have less capable of doing out a wider list of useful and almost any type of business.

American transport companies, including those based in Alaska, Hawaii, and the Philippine Islands, and Pan American and TWA Airway-Consolidated, with many of their airplanes permanently stationed in South and Central America and in the West Indies and Mexico, have 236 planes licensed at present. Their general grouping by type and by year of manufacture is indicated in the square and dot chart at the top of the page. Of the nine airlines built prior to 1929 which are still upon the registers of the operating companies practically all are now in



Year of manufacture

reserve. 1929 was the year of the great air transport expansion and the demand for new transport equipment rose almost beyond the capacity of the available factories. Naturally the airlines fully stocked at the end of that year had little need for replacement in 1930 and 1931, and although their operations were expanding quite steadily they were also becoming less in need of new equipment and making the same number of airplanes to the increased amount of flying. Replacement purchases began to play a part in 1931, but it is only with the beginning of the present year that there were whole flocks of really being felt. So rapid has been the advance in the aeronautical arts within the last couple of years that planes three or four years old though still perfectly safe and sound, are considered as obsolete on grounds of economy. The notable progress toward self-support of aviation that has been recorded there, which can only be estimated if the airlines are kept in a financial position to make a rapid turnover of their equipment, and to allow other material to pass out of service on grounds of obsolescence whenever material possessions in ordinary use become obsolete through the adoption of newer types. 1932 and 1933 promise to be the great years of replacement of the last of the 1929 equipment, and present estimates are that by the end of the present year at least 100 machines of 1932 production will be in transport service. Practically all of them will fit into the three classes of the chart that cover the cabin machines accommodated seven or more passengers. The city of the new addition in the transport line is passing. Not a single one went into service during the past year, and most of those built in 1929 and earlier years will disappear and be replaced by cabin machines designed for several passengers and could serve within the next year or two, shortly meaning that the air mail is continued in something like its present status. The transport planes of 1933 manufacture will, in almost every case, be from 25 to 30 per cent faster than the four-year-old planes which they are replacing. A chart on page 69 gives indication, in very pertinent terms, of what that means to the traveler.

How the planes are built

The business of manufacturing transport planes is widely enough divided so that there is no sign of monopoly, while at the same time that manufactur-

ing is a very serious degree. Eight companies account for 50 per cent of the airplane now used on American transport lines, and that is just about the same number that are actively seeking to develop a market for new transport planes at the present time. Five producers now have more than 50 machines each in transport service.

There is a similarly wide distribution in the manufacture of private planes. Of the 546 machines which issued forth from American factories in 1932 for non-military use, no one factory built as many as 20 per cent. The two leading producers were located among five states. Of the ten leaders in numbers of machines, four build light planes only, two build only cabin machines, and the other four have a mixed order. Only one of the groups leading in private-plane production has any share in the American military market, and in that case the military and the commercial work are done in different factories. For under present conditions, with the private market as small as it now is, it has proven to be most economical and generally unobtainable to use a military and a private-plane business in the same plant. The building of planes for the Army and Navy involves problems and obligations which do not exist in the same form in making low-powered and low-price planes for private use. Such craft can be produced more efficiently in a small plant that does not attempt to duplicate the elaborate organization that is indispensable in connection with present military production and still

most indispensable in order that a factory may be an effective unit in a national military plan, to be asked upon its capacity with the necessary capacity and flexibility to adjust itself to any demand that may arise in the event of war. So it is that the American industry, in the interest of getting the most and the best results for the least money at present, is divided into two main groups. On the one hand there are about six factories principally concerned with military manufacture; on the other, there are more twenty or thirty companies, some of them quite massive for the time being, that occupy themselves almost entirely with non-military work and especially with planes of the smaller type. Most of the holders of transport are in the first group, but a couple of leaders in that field are in the second. Aside from one or two instances of common ownership of commercial and military factories, the division exists between the commercial and military products comes in the export trade, where several South American countries have based American commercial airplanes, with whose manufacturers or some of them, to be actually used for certain military uses under the special conditions that confront their air forces.

The export business was a veritable life-line to the American airplane last year. More than a quarter of the total production went abroad, much of it to equip airlines in Europe and in South America. There could be no higher tribute to the quality of American planes, for the competition with British and French and German and Italian products is keen indeed.



See page 136 for details

AMERICAN MANUFACTURING IS WELL DISTRIBUTED OVER THE COUNTRY There are ten factories that have more than 10 airplanes licensed. California and New York lead a close race for first place, but eighteen other states have over a hundred planes each.

Foreign trade in 1932

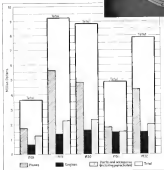
A banner year

THAT the aircraft export business was able to make good headway against the economic stresses during the past year is the best possible evidence of the extent to which American airplanes and engines are sold throughout the world. Almost seventy per cent of the total airplane production of American factories (in dollar value) went abroad, and approximately one-sixth of the total engine production. Another fraction had over run airplanes sent to high prices. While industry depends to large extent on exports for much of the industry's prosperity, commercial business can be said to play an important part, especially on engines. Continued development of the foreign market is among the most important factors in determining the industry's future progress and its ability to keep itself in readiness to seek sudden American demands.



WHERE EXPORTS GO. The average distribution over the last four years by continent and country. Canada and Mexico are shown; that for the first place—China—includes China, a great benefit. It will, however, mean, naturally, that all the rest of Europe, South and Central America, and the United States are left to the total.

PLANES AND ENGINES AND PARTS. Through the total of all American exports in this case of 51 per cent from the production line, the shipment of assembled products showed only 15 per cent total. The 35 per cent and more than 50 per cent share of 1931. Engines alone showed more than an 80 per cent of 51, and have reached almost 100 per cent in 1932. American power plants become more and more popular in foreign military and commercial service.



Twelve hundred airports

And 20,000 miles of airways

AIRPLANES are referred to as ports. Without airports, and many of them, aerial operations become impractical and dangerous. With second-rate facilities, the operators of aircraft are likely to be limited to second-rate patronage, and provide owners get second-rate service. The airport has long been recognized as the very heart of the aeronautical problem, and it is with considerable satisfaction that we can celebrate the progress that has been made.

A total of 1,264 airports are now in service in the United States—541 of them municipally owned and operated, and 623 contracted. They represent an aggregate investment of about \$150,000,000. To justify that investment and to realize a return upon it aviation must continue to move forward.

The best economy, from the point of view of the municipality that has built and maintains an airport, is in providing the necessary improvement for airplanes to operate there in order that citizens and visitors may really get the fullest benefit out of the city's new facility.

That is so generally realized that even the herbage of the last three years and the smallest progress that has been carried for greater economy by all divisions of government have had very

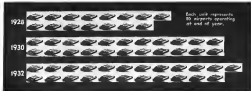
little adverse effect on the airport situation. A few fields have had to be shut down here and there, but new ones are being opened up all the time. At the end of 1932 the total number of ports in service is about 250 above the total at the time, three years earlier, when the first signs of economic catastrophe appeared on the eastern horizon.

A regular airport with extensive fixed installations is necessary as a base of operation for an airplane, but any clear



One airport in 100 square miles

THE DISTRIBUTION OF AIRPORTS. Through 15 states have more than 100 airports each. But in only two states is the number of airports more than 100. The number of airports in each state is shown in the map. The number of airports in each state is shown in the map. The number of airports in each state is shown in the map.



NUMBER OF MUNICIPAL AND COMMERCIAL AIRPORTS IN OPERATION. Even though many airports have had to be shut down, the total of operations has not been reduced. The number of airports in operation has increased to 1,264. At the end of 1932 it stands at 1,264 airports and 20,000 miles of airways.

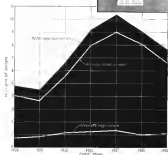
and level area can be a potential help in time of trouble. The regular airports are supplemented at the present time by 352 intermediate fields along Federal airways, maintained by the Department of Commerce, and 498 unimproved auxiliary fields. There are also a certain number of Army and Navy fields, which are not regularly open to the non-military public but which can be used in emergency.

As first sight the airport picture may appear very satisfactory. In some parts of the country it is. A number of the larger cities are adequately provided for, up to a safe margin beyond the level of their present needs. In certain coastal sections of the country fields are so thickly distributed as safety and the interests of the non-remotely placed use of airplanes demand. Unfortunately, however, such areas are still somewhat exceptional in distribution. Parts of the United States there certainly ought to be at least one landing field every twenty miles in every direction, and that requires about one for every 300 acres of area. In level and thinly-populated territory, of course, a considerably wider spacing is permissible, but to provide a proper coverage there ought to be a total of at least 2,000 main airports and another 3,500 well-served intermediate and auxiliary fields in the continental United States. The cost of such construction need not be great. Most of the expense of airport work goes into the purchase of land and the provision of the necessarily expensive construction for the parts attached to large cities. Most such costs are now well under \$10, and attention can be devoted to smaller places. There are full a dozen airports in towns of less than 5,000 population for every one that is situated in a city of over 500,000, and there are a dozen that cost less than \$25,000 complete for every one of the extremely famous

above places that run into a million dollars or more.

There are at present about 220 fields that serve as stops on transport lines, and about 180 that have five or more commercial airplanes (not counting biplane machines) in regular local operation. Private ownership is even more widely distributed.

DEFERRED AIRWAYS. The Department of Commerce has built six airways running up to a present total of 14,000 miles, but with less than five miles of them in use. There are some danger that national appropriations may make it extremely difficult to get these airways to their present end.



FOR THE DEPARTMENT OF COMMERCE AERONAUTICS BRANCH OUR SPECIAL REPORTERS HAVE RECENTLY MADE A TRIP TO THE AIRPORTS OF THE UNITED STATES. THE FOLLOWING ARE SOME OF THE RESULTS OF THEIR VISIT.

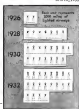
ACKNOWLEDGMENT

THE making of any such collection of material, as is here presented, of course, required that we draw upon a great many sources of information. Although the forms of presentation and interpretation have been recently developed with our organization, the basic figures have become available through the co-operation of many official and unofficial organizations and groups. Our first and greatest

obligation, which it is a particular pleasure in acknowledging, is to the personnel of the Aeronautics Branch of the Department of Commerce. They have been unerring in their helpfulness.

We must express particular gratitude also to the staff of the Aeronautics and Commerce Branch, to the Post Office Department, to the Department of War and of the Navy to the Statistical Advisory Committee for Aeronautics

to many individuals and companies that have responded to questions about their own activities; to the aeronautical division of the Bureau Veritas, and to the officials of a number of European governments both for their willingness to furnish special material on request and for providing the exceptionally complete and sound collections of information on aeronautical progress which some of them compile.



Aeronautical securities gain ground

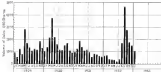
Show belief that aviation will continue to grow

THE stock market plays a much increased part in aviation affairs now, as compared with the significant role that it served to be taking four years ago. Still, however, it furnishes a useful index of what the financial community thinks about the future, and especially of the average of intelligent business judgment of the prospects of the various

industries represented on the stock exchange. Through the first half of last year the aircraft and air transport stocks as a whole were dragging along on the bottom, with very little public interest in their state and with their prices more than falling behind the average for the rest of the market. In September they had become market leaders. Transactions in aeronautical stocks

were running over 100,000 shares a day, and the average of their prices was running up far above the general average. The relative market position of the aeronautical securities is stronger now than at any other time in the past three years.

Going far beyond the effect of any particular recovery in any particular market, the reasons for a rapid reversal of fate are plain. The reaction of public feeling after the failure of the already exaggerated optimism of 1929 reached its end. The financial community has again begun to look at aviation with open eyes and as open roads, and a new confidence in the future of the aircraft industry and of air transportation has resulted. Stocks were bought last fall, and they are being bought now, not so much of their present earnings but as the strength of an assured belief that the growth of aviation will continue, and that aircraft will take a place of growing relative importance in the national world.



Range of aircraft stock prices and volume of sales of aeronautical securities on the New York Stock Exchange. Following three years in which aeronautical stocks declined with or somewhat less a than most rapidly there, the greatest burst of activity since, they have shown the results of steady increase in public interest and confidence. During the last six months of 1952 the aircraft stock market was well above the general level, and the volume of sales reached unprecedented heights. During September the transactions in aircraft and air transport stocks totaled over a billion shares, more than 10 per cent above the highest figure for any month during the 1950 bull market. The average price at the fall of the year over 100 per cent higher than during 1951. The financial world's confidence in the importance of aviation's future is plain.



Proportion of sales of aeronautical securities to total sales on the New York Stock Exchange through the last four years. Through the period of the so-called "boom" aeronautical securities played a minor part in making up the total record of transactions on the New York exchange. They gradually increased for a while but then, in the last four years, they have become a major part of the total record. Through the last two and a half years of September they had almost in that same level. The last half of 1952 with the remarkable record of activity in the aircraft stock market and of public confidence in the future of aviation has been a leading point, with more than three times as much as one does in the average of the years of the boom and in the period of the slump.

Aviation Authority convention

The responsibility of airlines to their passengers and to the shippers of goods has just been internationally strengthened for a number of countries attending the convention at Warsaw, which opened its effort on Feb. 12. Six European countries and Brazil were the first to give full effect to the convention. It provides that the maximum responsibility of an airline for injury or death of a passenger shall be \$5,000. Other passengers see maximum allowance to \$1 per pound of weight. Any additional value must be covered by insurance of reinforcement for loss to be insured. The convention further assigns airlines from all responsibility when they can show that reasonable precautions were taken and that no adequate negligence caused. American courts have commonly held American airlines to a liability higher degree of responsibility than the new convention requires.

Another record goes British

After two years' patient plotting and working for geographic knowledge over the Sahara, a French monoplane Super-argenteo, with Commandeur Amédée van Lierdonck as pilot, has flown a new record. Lack of fuel forced it down 57 hours and 25 minutes later at Walles, Ben, South Africa, 788 miles from the goal, Cape Town, but 327 miles further than the previous record flight, made by Russell Bonneau and John Poulson from New York to Istanbul in 1930 in a accelerated turbine, without benefit of auxiliary fuel. The big monoplane, similar to the machine which landed in the Atlas Mountains in a 1929 London-Cape Town trial, carried more than 1,200 gal of fuel in its 32-ft wings, 7000 lbs, 3,304-mile flight. Squadron Leader G. E. Garwood and Flight Lieutenant G. E. Stokely, in the B.A. 7, brought the third major world's airplane record to

Great Britain which already holds the records for speed and altitude.

Woolfin again

At the same time, Captain Woolfin was in the air making his sixth record-breaking flight of the last 24 years in his four days, and three days and ten hours elapsed time, but very four-ty-five-year-old Woolfin flew the 4,300 miles from London, England to Natal, Brazil. The transatlantic flight from Tlaca, Senegal, on the west coast of Africa, to about two hours earlier than the time made in January by the British transport plane which is now preparing for its return flight.

It is worth noting that the Council of the United States-Mexico, from the Mexican side, American-built B-2C radio-controlled spark plug, American engines, Wright Whetwells, general Air Commodore Kingfield-Smith, American Fokker plane, most recent achievement at a 14-hour flight over the Tanager Sea from Australia to New Zealand on the report of that could mean which it is hoped to establish over the track.

Air transport fly afield

The Far East is the scene of new ventures to transport to and from military aviation. Weekly air mail and passenger service from China to Russia is reported to have been inaugurated when planes operated by the Russian Aviation Corporation left Peking and Shanghai simultaneously on the morning of Dec. 15. Scheduled to meet at Leningrad, they continue on single schedule to Leningrad and Thim on the Russian border. The 3,500-mile trip takes four days, costs \$25.

The first knowledge of enemy movements, Navy's 1942, will see the departure of the first Japanese from the Philippines in an enemy carrier and South America return. Rio de Janeiro

is the southern terminus and landings are scheduled at Pernambuco and Recife, where the Spanish Government has authorized the construction of a mooring mast. All at a cost of \$270, about a third higher than minimum first class fare on express steamer, travel time between the continents is cut from twelve to three days.

Money matters

A 1903's bomb dropped from a transport plane back to a strange tale of money on the Dutch banking. The Dutch Government in East Indian waters. Protesting against pay cuts, the native crew seized the ship while the commander was asleep at Rotterdam and proceeded towards Surabaya to release comrades imprisoned there. Flight instructor brought the show-down. The first bomb dropped on the ship was direct but with deadly effect. When a tow away the bomber, before capture was and starting a fire, the crew took to boats and surrendered.

Money plays key

Anything but the strong in the Black Sea, according through Pacific waters from Hawaiian victories to attack the West Coast in Pavilion 14, the 1950 naval war game. In 25 ships, including two aircraft carriers, the fleet, in the service, were much inferior in their tonnage to the Blue defending forces. However, the 112 vessels attacked along the coast from Pagan Island to San Diego were unable to return the 375 planes of the Black fleet. The fleet could reach on both San Pedro and San Francisco. While 60 Black planes from the barracks had wide San Francisco, they were not ready to return. The carrier itself and on 23 remaining aircraft were demolished by the Blue forces by way of retaliation. No more was to be expected. Replacement of the navy's command, more small carrier like the Ranger now under construction, and planes of larger range were considered needs seen by naval officers at a small of the game.

Aeronautics would have the word

Asked to indicate the effect on the Navy of the 1949 act which would be applied to all departmental appropriations under an amendment to an appropriation bill adopted by the Senate, Secretary Adams pointed out that the Navy's air force was not threatened with particularly bad treatment. The 5 per cent cut in the Navy's bill would, the secretary said, require a complete turning up of the ledger and upon the Lexington or Saratoga, and strike a disarming of the Navy in a failure to maintain the Navy's aircraft carrier fleet. Right now, strength would both be reduced \$2 per

**BORNEOS IN SWEDEN**

Recent studies in the East of British Government in this Stockholm with Swedish Air Force to increase and train with P-40 and P-47 during the attack in a heavy-armed Swedish fighter aircraft carried with three P-40 and P-47 aircraft. The top speed of 300 mph, no aircraft is recorded by other European transports of this type.

cost. No other data of combined port vessels would, according to the Secretary's file, waterlogs to large a relative loss.

As stated by the House, also a debate of record-making brevity (five hours), the Navy Appropriation bill shows \$21,257,150 to the Bureau of Aeronautics, and a half million below the figure for the current fiscal year and \$64,822 less than the budget estimate. Appropriation for maintenance of active activities is up 20 per cent, \$760,000 while provision for new aircraft is \$460,000 below the current year's figure.

A provision to cut the flying pay is offered in the higher prices was considered from the bill early in the debate.

Amendment to the Reconstruction Finance Corporation bill would provide for loans for the construction of aircraft plants for overseas trade and for port facilities situated to their use.

Announcing the Moon

On March 13 the Moon, the sister of the Moon, will be in the air when the Ranger for the first time at the head of the Goddard Space Flight Corp. This week after the launching and threatening tremendous flight trials

are scheduled to begin, upon the conclusion of which the new airship will proceed to the Pacific Coast to be based at the Naval Air Station at San Diego, Calif. Immediately the duplicate of last year's ship, the Moon, officially designated XRS-1, incorporates a number of new improvements.

The property of helium produced by the Moon at Moon, a body more of five years ago, was brought to life by the report of the Chairman Committee of the House of Representatives, investigating government corruption with private interests. The Bureau of Mines, formerly known as the only important private producer of helium, has practically done private industry from the fold. The National Helium Corporation, the only one brought back, and that part of the Army and Navy helium requirements should be definitely allocated to private industry in order to uphold the industry.

No unified Air Corps

While the joint committee of the War and Navy Departments set up to study possible plans for a unified Air Corps, it would the project for a separate unified Air Corps and found it wanting. It also recommended closer cooperation and co-ordination between the two air services now existing. The committee recommended further study of the practicability of joint use of depot and maintenance facilities, as well as of air fields. A unified Air Corps would further emphasize an unified administration, decrease the efficiency of the Bureau and Air Force, as well as of air fields.

A Provisional plan of 375 hours training at the Air Corps Primary Flying School, Randolph Field, Tex., on March 12, 1951, the Air Corps will be trained more and 343 in which are working there for the making of airplane pilot. At the end of the year's course, the Air Corps will be trained in addition a maintenance of second lieutenant in the Air Reserve, and may be placed on extended service duty with the Air Corps.

Fast bombers for the Air Corps

New flying equipment for the Air Corps and National Guard has been recommended for by the War Department to the tune of about \$3,000,000. Largest order goes to the Glenn L. Martin Company of Baltimore, Md., which is to supply 100 land-based planes, totaling \$1,000,000, the order covers three closely-related models designated as YB-10, YB-12, and YB-13. All are mid-wing, single-engine, single-engine with two radial air-cooled engines of about 850 hp. Though performance figures have been withheld, they are reported to be capable of 400 mph in the forward position a year for their money, even with a 2,000-lb. load

of bombs. High-speed comparison of the new bombers are the new Boeing B-26 Mustang, 111 of which are scheduled to be delivered to the Air Corps by the end of the year. A single-engine, low-wing monoplane with Pratt & Whitney Wasp major supercharged to about 320 hp, the B-26 is normally identical with the plane which under the experimental designation XP-52C has been undergoing intensive service tests. With engineering data and spare parts, this order includes 100 B-26's per year. Contract for the single-engine cargo transport, Type B-27A, has been awarded to Lockheed Aircraft Co. of New Glarus, Wis. Similar to their successful prototype, the Arden, the transports with their complement of seven will cost \$250,000.

Admission should provide for the purchase of B-28C observation planes from Douglas Aircraft Company for use by the National Guard. Requirements of the Air Corps for B-28C with better streamlining, about the engines and with pilot and observer cockpits enclosed, these planes are priced at \$254,214. Twenty-four Pratt & Whitney Raptor engines with spare parts have been requested for at an additional cost of \$147,728.

Joint "shotshell" research

Two companies which for a number of years have been investigating the "shotshell" system of search continuous independently of each other have arranged to carry on further developments jointly. Under the leadership of Colonel Randolph, the Edward G. Budd Manufacturing Company has been engaged in laboratory work in the method of standard steel construction. Carl de Gault and his associates in Phoenix, Ariz., are working on the shotshell, both carrying on along similar lines. To prevent duplication of costly experimental research and therefore cost the scope, rights to the shotshell are covered by application and patents are being cross-licensed from one company to the other, as is the right to reformulate the shotshell in the shotshell industry. Shotshell in Italy and France in France already was the "shotshell" system under license from Budd.

Generville reorganization

Designers and builders of the world's land-based speed record holder, the Generville Brothers have reorganized to form the Generville Brothers Corp. Alfred D. Chandler and William D. Harburt are respectively secretary-treasurer and vice-president of the new organization. The Generville Brothers, William A. Harburt, Corporation and its treasurer still has registration a few weeks ago. Chandler is also president of the Generville Brothers Corp. and is backed with Cape Cod, Nantucket and Martha's Vineyard. Harburt will

**AMERICAN ENGINES FOR GERMAN FLYING BOATS**

Van Dusen, General Corporation, power the Deutsche Flug-Motoren plant built for operations on the Baltic Sea in Königsberg and Yarmouth.

THE BUYERS' LOG BOOK

Vibration insulation

THE discussion of direct vibration from engines and propellers is one of the most important considerations in the design of modern transport airplanes. Vibration is not only unpleasant for passengers, but frequently accounts for damage and consequent loss of reliability of propulsive instruments. The control of vibration is several fold: follows the basic general principles laid down for other industrial processes, and the Lund Manufacturing Company of Erie, Pa. has recently applied successfully an existing type of bonded rubber mounting in airplane instrument bays and other parts. Plane-borne mountings, under road or ocean, as shown in the accompanying illustration, may be used to isolate instrument panels in members of the primary structure. The rubber shoe covers vary from 1 to 2 in., and the center hole from a No. 10 drill to 11 in. The central parts of the standard shafts are mild-rolled steel. Special castings of cast iron, aluminum, or aluminum-bronze steel may also be utilized.—*AVIATION*, March, 1933

Airport signal gun

MANY airports where traffic is heavy have adopted the light-house signal system of lighthouse engineers, first developed at London's busy Croydon. Dequailing "gun" has appeared in many times, varying with the season of land personnel and the materials used at hand. With up-to-date Electric & Manufacturing Company of East Pittsburgh, Pa. has recently made an-



March-Electric & Manufacturing
Company



Each instrument mounting unit
is vibration-isolating from its
support frame.

arrangement of a standardized signaling gun now available commercially. The unit consists of a barrel, 16 in. in diameter and 16 in. long, lined with two lead-grap facilities and carefully balanced to reduce fatigue. It shoots a very narrow beam of light, red or green at the option of the dispatcher. A sighting tube permits accurate aiming at any desired airplane, and the extremely narrow beam centers that the ship on which it is aimed is the only one from which the signal may be seen. In the daytime the beam is said to be visible at 12 miles, at night 15 miles.—*AVIATION*, March, 1933

G.E. 16-port lamp

INCANDESCENT lamps of a relatively new type of construction have recently been made available for commercial use by the General Electric Company of Schenectady, N. Y. The new lamp differs from the conventional in two particulars. In the first place the new style bases consist simply of two heavy copper prongs, projecting through a glass cup and, normally, the filament used is firmly supported on two heavy vertical nickel channels held together by horizontal bars of supporting material, a mounting that permits spinning shifting of base. By the selection of metals and glass having the same rates of thermal expansion the connecting prongs are not directly into the glass base, thus insulating the most or less costly and complicated lead-in arrangement used in high-powered lamps of earlier design. These lamps are available in 300-watt sizes for airport floodlighting, and have recently been approved by the Aeronautics division of the American Branch of the Department of Commerce for the 1,000-watt rotating beacon service.—*AVIATION*, March, 1933

Dynamometer

A TRANSMISSION TYPE dynamometer intended for testing airplane engines and propellers up to 1,000

hp has been developed by the Farmington Company, Inc. of Buffalo, N. Y. The overall diameter of the dynamometer has been made as small as possible (17 in. in the working limit) in diameter to give wide clearance of engine cooling by the propeller side stream. The operation is based on the reaction of bearings in the two-pressure of gears. The apparatus consists essentially of a housing containing two sets of gears, each pair consisting of an externally-toothed pinion, engaging an internally-toothed gear, is arranged so that the driving and driven shafts are in alignment, and the centrifugal gear shaft offset from the main shaft. The torque reaction between the shafts and auxiliary shaft is measured by a torque arm. The machine is also designed to measure the thrust reaction of the propeller. Although designed primarily for aircraft power plant use, the dynamometer may be applied to a number of other industrial power transmitting mechanisms.—*AVIATION*, March, 1933



Screw drivers

HOT-FORGED tips and shafts set in unbreakable shockproof handles furnish a new line of screw drivers for the Stanley Rule & Level Plant of New Britain, Conn. Handles are forged integral with the blades to protect driving the blade up into the handle under heavy pressure. The handles are of a diamond-shaped unadorned composition of high tensile strength, which is unaffected by moisture or oil. Five sizes are available.—*AVIATION*, March, 1933

Stanavo engine data book

GENERAL dimensions of the propeller of Stanavo gasoline and oil, together with specific recommendations for the use of Stanavo propellers with various aircraft engines are contained in a little booklet distributed by the Stanavo Specifications Board, Inc. Copies are available upon request through any Standard Oil distributor.—*AVIATION*, March, 1933

Conquering the Air for the benefit of Mankind



LET US SUPPORT THIS VITAL INDUSTRY

AVIATION . . . what strides it has made since the days of the great war . . . Then, in the space of a few short months it became one of the most important arms of national and international defense. Today . . . within the space of a few short years it has become a very vital factor in the daily conduct of business, in speedy transportation . . . of mail—of passengers—of valuable express.

We urge our Government to continue to give the adequate support so necessary to the development of its present and future possibilities . . . to the increase of its efficient service and its safety . . . and to its improved application to the business and social life of our country.

Let us not lag behind other nations in our appreciation and support of this important branch of transportation which symbolizes, as nothing else does, man's dominion over time and space . . . and his utilization of speed and safety to the benefit of commerce and our national development.

It is with pride that the Kendall Refining Company points to its part in supplying aviation with lubricants of such a high order of quality that today Kendall, The 30 Hour Oil, has become the best known (and we believe the best kind) oil in both commercial and private flying.

KENDALL REFINING COMPANY

BRADFORD, PA.

KENDALL

THE 30 HOUR OIL



It's the air express these days

¶ The shippers of the nation are turning to the air. It is a tremendous development in modern business—and in this movement American Airways, Inc. stands out as a leader. ¶ Here is one of the latest Seinson tri-motored express planes of American Airways for the transportation of express, mail and passengers. It is an example of the fast modern planes in this service. ¶ On these schedules, safety and dispatch are of paramount importance. Motors must function per-

fectly. Effective lubrication is vital. ¶ American Airways, Inc. uses Texaco Airplane Oil exclusively. The performance of the clean, carbon-free Texaco Airplane Oil, its heat-resistant body and its excellent lubricating qualities have given it the preference. Texaco Airplane Oil and other Texaco Aviation Products are available at principal airports in all our 48 States.

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First came the **AIRWHEEL**

Then came the internal
expanding **AIRWHEEL BRAKE**

NOW comes
the **FIRST HYDRAULIC
BRAKE** originated for Airplanes

HERE is a hydraulic brake as definitely built for airplane service as that first great super-soft tire which Goodyear named "Airwheel."

It applies a totally new principle to deceleration—not just a brake design borrowed from the motor car.

Instead of brake bands and drums, it uses the metal disc clutch principle which means—

400% more braking area than a comparable size band type brake provides

95% of the power applied to the brake point delivered to the brake unit

Smoothness—reserve power—non-fading

Instantaneous release at all times

Far better heat dissipation—no overheating

Operation with approximately 25% of the oil pressure required for hydraulically operated band brakes

This new Goodyear brake unit consists of alternate discs of bronze and steel—long-wearing and easy to replace. The unit compares favorably in weight with other type brakes—and is in line on price. It simplifies the design of new ships—and can be easily installed on ships now equipped with any other type of brake.

For complete data and prices write to Aeromarine Department, Goodyear, Akron, Ohio, or Los Angeles, California.



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GENERAL ELECTRIC



Left—American Airlines seaplane flies the mail route from the Atlantic to the Pacific. Right—small "float" boat. The water plane part of boat.

Right—Hugoboss a boat in Lake Washington, W. B. shows the "float" part of the plane. The plane is a "float" plane. The plane is a "float" plane. The plane is a "float" plane.



EDO FLOATS



Left—At the "float" part of the plane, the plane is a "float" plane. The plane is a "float" plane. The plane is a "float" plane.

Right—Canada Airways Ltd. probably won't lose a seaplane operation. One of the 400 float planes is a "float" plane. The plane is a "float" plane.



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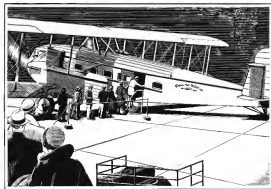


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